

Construction industry productivity and the potential for collaborative practice



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Abstract

The construction industry is widely recognised as a laggard in terms of productivity improvement. This research study identifies the factors inhibiting collaboration and provides a model for developing a collaborative network approach. The case studies conducted examine the factors impacting on collaboration in the project networks of three large construction organisations. It was found that excessive fragmentation in the industry together with disparate project management processes and non-standardised information is impeding efficiency gains. A panel of project experts reviewed the findings to explain the basis of the practices. This has led to four primary conclusions: (1.) the construction industry lacks the ‘strength’ of relationships necessary to create a network of organisations that trust and have shared values; (2.) design processes should include both value engineering and lifecycle costing; (3.) procedures and information need to be standardised; (4.) there should be more emphasis on value adding project management activities.

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1. Introduction

Numerous researchers have highlighted the construction industry’s poor productivity levels and assert that it lags behind other industries in terms of efficiency improvements (Bankvall et al., 2010). The Australian Bureau of Statistics reported that the construction industry had negligible multifactor productivity¹ gains between 1986 and 2008 (Australian Bureau of Statistics, 2011). The USA actually saw a reduction in multifactor productivity in the construction industry between 1987 and 2008 (USA, Bureau of Labor Statistics, 2011). It might be claimed that the global financial crisis had an effect, however, there was not any improvement in construction industry multifactor productivity in Australia between 1986 and 2002 or in the USA between 1987 and

2003. There have been some positive years of productivity growth but there is clearly an underlying problem.

Productivity improvements in many sectors have been driven by investments in information technology. Prior to the late 1980s there was, what was coined by American economist Robert Solow, a productivity paradox where expenditure in information technology (IT) did not result in multifactor productivity gains (Solow, 1987). However, since then most industries have seen a marked improvement that has been largely attributed to IT enabling collaboration between organisations in terms of partnerships and logistics (David, 1990). These collaborative practices have been underpinned by industry wide diffusion of IT and standardisation of processes (Brynjolfsson & Hitt, 1996). Connolly and Fox (2006) of the Reserve Bank of Australia identified productivity gains to be very positive for industries that invest in high-tech capital. However, investment in technology in the construction industry lags behind many other industries such as consumer goods, home electronics and the automotive industry (Lönngren et al., 2010).

Collaboration is seen as a mainstay of efficiency improvements as it enables integration and automation of processes (Mehrjerdi,

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¹ Multifactor productivity (MFP) is the part of output growth that cannot be attributed to the growth of labour or capital inputs. MFP reflects such things as business process innovations, advances in technology, or almost any other type of improvement in the efficiency of a firm’s operations (Australian Bureau of Statistics, 2011).

2009). A study by AMA Research demonstrated that collaboration can improve profits for all supply chain partners by as much as 3% (Attaran and Attaran, 2007). Collaborative partnerships can also improve product design.

There have been few studies concerning collaboration in the industry (Xie et al., 2010). This study takes an explorative view of the processes that underpin the relationships in the construction industry to ascertain how collaboration occurs and identifies factors inhibiting productivity improvements. The objective of this study is to identify factors inhibiting collaboration and to determine how collaboration might be improved in the construction industry. The interpretive study has its basis in supply chain management. Supply chain management theory is used to establish a backdrop to the study and position data. Three very large organisations that are undertaking extensive constructions participated in the study. The findings from the organisations were discussed with a panel of project experts to clarify the rationale for industry practice and pinpoint areas that might be improved. The research is significant to both academia and practice as it directly addresses the manner of collaboration and marshals the contribution of other recent research. The findings are particularly relevant to practice as productivity improvement is the foundation of macroeconomic progress and Australia is heavily reliant upon the construction industry.

Since the 1990s there has been much interest in understanding the deficiencies and identifying solutions that enhance the coordination of both subcontractors and suppliers in the construction SC (Segerstedt and Olofsson, 2010) and considerable research has already been undertaken in this area (Zou, 2009). The research has been addressed from many perspectives: logistics, purchasing, transportation, operations management, marketing and R&D (Arlbjørn et al., 2011). There is however a lack of research concerning collaboration (Crespin-Mazet and Ghauri, 2007). This research addresses this shortfall by identifying areas of wasteful practice and the potential for improvements in collaboration.

A review of the extant literature determined a pre-scientific stage of research (Cresswell, 1994) and therefore the study is explorative. The research has two questions: (1.) Identify the factors inhibiting collaboration within the construction industry (2.) How can collaboration be improved in the construction industry? These research questions were further decomposed to interview questions related to the key issues found from the literature, in particular fragmentation, relationships and small and medium enterprise issues. A qualitative case study approach has been utilised as it is an appropriate instrument for exploratory research that seeks to answer ‘how’ and ‘what’ type questions (Yin, 2003). Supply chain theory is used to identify the nuances of construction collaboration and has been utilised in this study as a basis for an interview guide to understand organisations’ collaborative practices and information requirements.

The following summarises the extant literature concerning construction supply chain management (SCM) and collaborative project management practices. The research design is described and the practices of three major construction organisations explained. An expert panel explication of construction project management process is also presented. Findings are discussed

and conclusions drawn. The paper concludes with implications and the potential for future research.

2. Collaboration and construction project practices

There has been some increase in collaboration in the construction industry, but there are many challenges and complexities still to overcome (Dietrich et al., 2010). These can be grouped around 1) fragmentation in the construction industry (Dainty et al., 2001; Froese et al., 1997; Love et al., 2002), 2) the large number of small enterprises in the supply chain (Hadaya and Pellerin, 2010; Lönnngren et al., 2010) 3) differences between manufacturing and construction supply chains and 4) the nature of relationships in the industry (Bankvall et al., 2010).

2.1. Fragmentation in the supply chain

Construction is defined by Eccles (1981) as the erection, maintenance, and repair of immobile structures, the demolition of existing structures, and land development. The market of the construction company is mostly local and highly volatile (Segerstedt and Olofsson, 2010) with subcontractors supplying 90% of labour and materials (Hartmann and Caerteling, 2010). Increasing complexity and competition in the industry mean that a construction company can no longer be managed as a separate entity (Zou, 2009). Bankvall et al. (2010) advocate a holistic view that recognises the interdependence of the components in the supply chain (SC).

A SC is a collection of trading partners that are connected through financial, information, and product/service flows (Fugate et al., 2006). Improved management of the processes that underpin a SC such as demand, design, material requirements planning, product delivery and subcontractor management have significant potential for improvement in the industry (Zou, 2009). Mentzer et al. (2001) defines supply chain management (SCM) as a “systemic coordination of the traditional business functions and tactics across these business functions within a particular organisation and across businesses within the SC for the purposes of improving the long-term performance of the individual organisations and the SC as a whole” (p.22). Clearly, information technology is a key enabler of supply chain integration. Information sharing is a key benefit of IT use including strategic, tactical and operational information and data. This can lead to cost reductions due to more accurate inventory levels and logistical improvements (Nath and Standing, 2010).

2.2. Small enterprises

When a construction project commences available subcontractors with the requisite skills are assigned. Benjaoran (2009) found that the majority of these organisations are SMEs and that they often employ local subcontractors for trade skills and physical labour. Small businesses tend to lack collaboration capability, since they do not have the resources to invest in systems to support collaboration, nor do they evaluate effectively their collaboration practices (Love et al., 2002).

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